HONORS ALGEBRA 2

MIDTERM REVIEW

Name _____

Name_____ Date_____

Honors Algebra 2 Midterm Review Packet

(Objectives, textbook review questions, review questions, answers to review questions)

Honors Algebra 2 - First Semester Objectives:

The students should be able to:

Chapter 1--Solving Equations and Inequalities

1. Use the order of operations to evaluate expressions.
2. Use formulas
3. Classify real numbers.
4. Use the properties of real numbers to evaluate expressions.
5. Translate verbal expressions into algebraic expressions and equations, and vice versa.
6. Solve equations using the properties of equality.
7. Evaluate expressions involving absolute values.
8. Solve absolute value equations
9. Solve inequalities.
10. Solve real-world problems involving inequalities.
11. Solve compound inequalities.
12. Solve absolute value inequalities.

Chapter 2--Linear Relations and Functions

1. Analyze and graph relations.
2. Find function values.
3. Identify linear equations and functions.
4. Write linear equations in slope-intercept form and standard form, and graph linear equations.
5. Find and use the slope of a line.
6. Graph parallel and perpendicular lines.
7. Write the equation of a line (slope-intercept form and standard form) given the slope and a point on the line.
8. Write the equation of a line parallel or perpendicular to a given line.
9. Draw scatter-plots.
10. Find and use prediction equations.
11. Identify and graph step, constant, and identity functions.
12. Identify and graph absolute value and piecewise functions.
13. Graph linear inequalities.
14. Solve and graph absolute value inequalities.

Three Space

1. Determine the coordinates of points in three dimensions.
2. Graph planes in three dimensions.
3. Determine the equations of the traces.

Chapter 3--Systems of Equations and Inequalities

1. Solve systems of linear equations by graphing.
2. Determine whether a system of linear equations is consistent and independent, consistent and dependent, or inconsistent.
3. Solve systems of linear equations by using substitution.
4. Solve systems of linear equations by using elimination.
5. Solve systems of inequalities by graphing.
6. Determine the coordinates of the vertices of a region formed by the graph of a system of inequalities.
7. Find the maximum and minimum values of a function over a region.
8. Solve real-world problems using linear programming.
9. Solve systems of linear equations in three variables.
10. Solve real-world problems using systems of linear equations in three variables.

Chapter 4--Matrices

1. Organize data in matrices.
2. Solve equations involving matrices.
3. Add and subtract matrices.
4. Multiply a matrix by a scalar.
5. Multiply matrices.
6. Use the properties of matrix multiplication.
7. Evaluate the determinant of a 2 x 2 matrix.
8. Evaluate the determinant of a 3 x 3 matrix.
9. Solve systems of two linear equations by using Cramer's Rule.
10. Solve systems of three linear equations by using Cramer's Rule.
11. Determine whether two matrices are inverses.
12. Find the inverse of a 2 x 2 matrix.
13. Write matrix equations for systems of equations.
14. Solve systems of equations using matrix equations.

Chapter 5—Polynomials and Radical Expressions

1. Multiply and divide monomials
2. Use expressions written in scientific notation.
3. Add and subtract polynomials.
4. Multiply polynomials.
5. Divide polynomials using long division.
6. Divide polynomials using synthetic division.
7. Factor polynomials.
8. Simplify polynomial quotients by factoring.
9. Simplify radicals.
10. Use a calculator to approximate radicals.
11. Simplify radical expressions.
12. Add, subtract, multiply, and divide radical expressions.
13. Write expressions with rational exponents in radical form, and vice versa.
14. Simplify expressions in exponential or radical form.
15. Solve equations containing radicals.
16. Solve inequalities containing radicals.
17. Add and subtract complex numbers.
18. Multiply and divide complex numbers.

Name_____ Date_____

HONORS ALGEBRA 2 MIDTERM REVIEW
Chapters 1 – 5

Use a separate sheet of paper to solve the review problems and place answers on the lines provided.

Simplify

1._____ $-2[-3(2-9)-6]/(-5)$

2._____ $3(-12) + 24/8 + 6 \cdot (-\frac{1}{2})$

3._____ $3[x^3 - 5(x^2 - 3x)] - [x + 4(x^2 - 2x)]$

4._____Solve the equation. $\frac{3}{2}(7+y) - \frac{5}{2}(2y+1) = -6$

5. _____Given $S = \frac{-1}{2}gt^2 + vt$, solve for g.

6._____Using the formula above and given S = - 56, t = 2, and v = 4, find the value for g.

7. _____Given $A = 2ngb + 4br$. Solve for b.

8._____Solve the inequality for n. $3(2-5n) - 4 < 20 - 6(3-2n)$

9._____Find the additive and multiplicative inverse for $\frac{4}{5}$.

10._____Find the additive and multiplicative inverse for -6.

11._____Solve and graph the absolute value inequality. $|2x + 1| \leq 5$

12._____Solve and graph the absolute value inequality. $|5 - 2m| > 7$

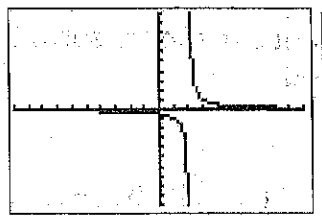
13._____Find three consecutive odd integers such that the sum of the last two is 7 less than three times the first.

14._____Is the relation a function? {(-1,2),(0,2),(.5,2),(5,2)}

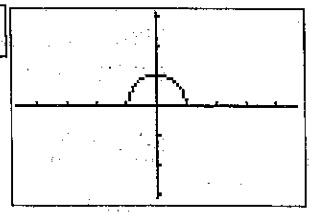
State the domain and range for the functions below. You can write your answer in set notation or interval notation. The equation and graph for each is given.

15. D_____ $f(x)=\frac{1}{x-2}$ #15

R_____



#16



16. D_____ $f(x)=\sqrt{1-x^2}$

R_____

17._____Given $g(x)= x^2 - 1$, find g(-3) and g(7).

18. Given a line containing the points (-2, 2) and (2, -3):

a._____Find the equation of the line in slope-intercept form.

b._____Find the slope of a line parallel to the given line.

c._____Find the slope of a line perpendicular to the given line.

19. Find the equations of the lines below in standard form Ax + By = C, where A, B, and C are integers (no fractions).

a._____Through the point (½ , 3) and parallel to the line 4x + y = -3.

b._____Through (3, -2) and perpendicular to the line through points (-1, -4) and (1,2).

20. Solve the system by the indicated method.

a._____ 4x + 2y = 0
3x + 4y = 5 elimination

b._____ 3x + y = 1
5x – 2y = 9 substitution

c._____ 2x – 3y = 7
-3x + 4y = -10 Cramer's Rule

d. Redo any one of a-c using matrix equations.

21. _____ Find the determinant. $\begin{vmatrix} -4 & 5 \\ 3 & 8 \end{vmatrix}$

22. _____ Solve for k: $\begin{vmatrix} 4k & 3 \\ k & 2 \end{vmatrix} = -15$

23. Find the product, if possible. $\begin{bmatrix} 3 & -2 \\ 5 & 1 \end{bmatrix} \bullet \begin{bmatrix} 4 & 1 \\ 2 & 7 \end{bmatrix}$ _____

24. Find the inverse, A^{-1}, for the matrix $A = \begin{bmatrix} 4 & -3 \\ 2 & 7 \end{bmatrix}$ _____

25. _____ Evaluate the following determinant by expansion by minors. $\begin{vmatrix} 3 & 1 & 2 \\ 4 & 3 & 0 \\ -1 & 3 & -4 \end{vmatrix}$

26. _____ Use Cramer's rule or elimination to solve the following system:

$$2x - y - z = 12$$
$$4x - y + 4z = 0$$
$$x + 2y + 2z = -4$$

27. _____ Find the area of the triangle with the given vertices, using determinants. (1,2), (5,6), (-6, 12).

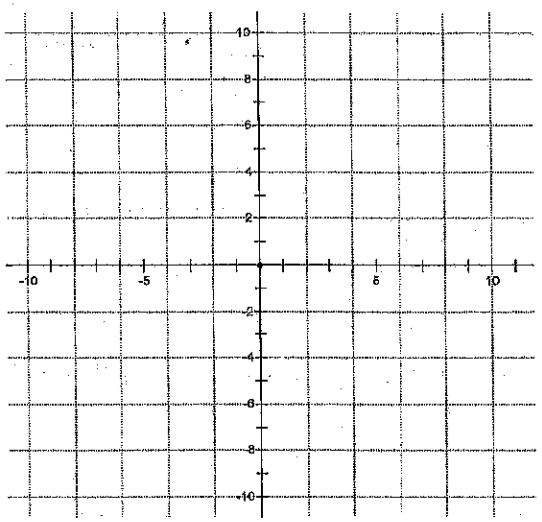
28. _____ The sum of two numbers is 130. One of the numbers is 46 more than half the other number. What are the numbers?

29. _____ Traveling downstream, a boat can go 12 miles in 2 hours. Going upstream, it makes only 2/3 the distance in twice the time. What is the rate of the boat in still water, and what is the rate of the current? Use a chart and the formula rate x time = distance

30. **Graph the system of inequalities**. Determine the coordinates of the corner points. Given the objective function f(x) = x + 2y, determine the max and min values.

$0 \le x \le 3 \quad 0 \le y \le -x + 5$

(x, y)	x + 2y



Write in simplest form.

31. _____ $\dfrac{(-2a^3d^{-2})^{-2}}{a^{-5}d}$

32. _____ $5^n \cdot 5^{n-8}$

33. _____ $4x^2 \cdot x^{-2}$

34. _____ Use synthetic division to divide . $\dfrac{x^4 - 3x^3 + x^2 - 5}{x+2}$

Factor completely.

35. _____ $2x^2 - 3x - 20$

36. _____ $8x^3 - 27$

37. _____ $16a^2b^2 - 49$

38. _____ $4x^2 - xy - 18y^2$

39. _____ $8xy - 6y - 12x + 9$

40. _____ $3x^4 - 48y^4$

Write in simplest radical form.

41. $\sqrt{48\,x^4y^5}$

42. $\sqrt[3]{54\,a^5b^6}$

43. $\sqrt{\dfrac{3}{5x}}$

44. $3\sqrt{12}-2\sqrt{50}+\sqrt{75}$

45. $(2+\sqrt{7})(2-\sqrt{7})$

46. $\dfrac{5}{3-\sqrt{3}}$

47. **Solve the radical equation.** $\sqrt{2x-3}+5=12$

Simplify.

48._____ $\dfrac{x^{\frac{3}{5}}}{x^{\frac{1}{4}}}$

Write in simplest radical form over the set of complex numbers.

49._____ $\sqrt{-32}$

50._____ $\sqrt{-4}\cdot\sqrt{-12}$

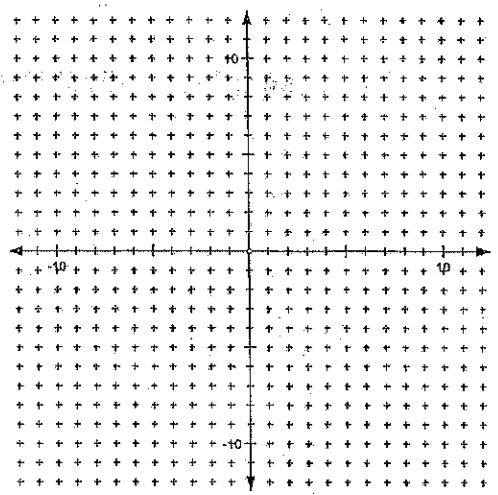
51._____ $\sqrt{-36a^3b^4}$

52._____ $\sqrt{-8}\cdot\sqrt{-32}$

53._____ $\dfrac{1+3i}{2-5i}$

54._____ **Solve over the set of complex numbers.** $2y^2 + 50 = 0$

55. Graph the following piecewise function:



$$f(x)=\begin{cases}4x & if \quad 0\le x<2\\ -2x+10 & if \quad 2\le x<5\\ 2 & if \quad 5\le x<10\end{cases}$$

What is the Domain?_____

What is the Range?_____

56. Determine the coordinates of the following points.

_____A

_____C

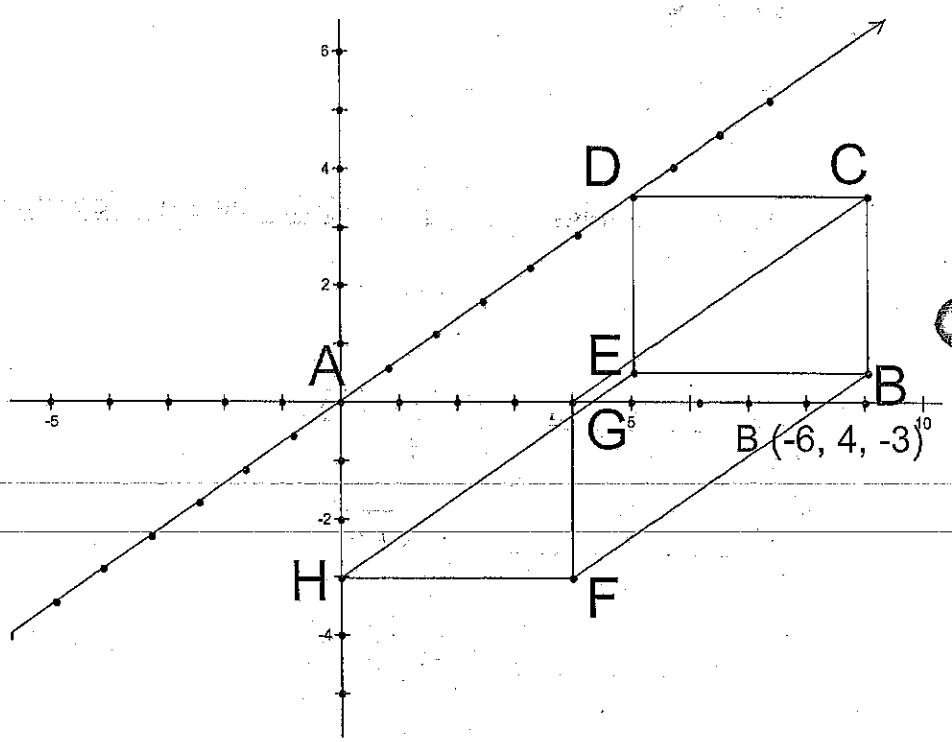
_____D

_____E

_____F

_____G

_____H



57. Graph the following equation. 3x + 4y + 6z =24 on the x-y-z plane.

58. A collection of 38 coins (nickels, dimes, and quarters) has a value of $3.70. There are twice as many dimes as quarters. How many of each coin are in the collection

Honors Alg. 2 Midterm Review Answer Key

1. 6
2. -36
3. $3x^3-19x^2+52x$
4. $\{4\}$
5. $g=\dfrac{-2(s-vt)}{t^2}$
6. $g=32$
7. $b=\dfrac{A}{2ng+4r}$
8. $N>0$ or $(0,\infty)$
9. additive inverse $=\dfrac{-4}{5}$
   mult. inv. $=\dfrac{5}{4}$
10. add. inv. $=6$
    mult. inv. $=\dfrac{-1}{6}$
11. $\{x: -3\le x\le 2\}$ or $[-3,2]$
12. $\{M: M<-1 \text{ OR } M>6\}$, $(-\infty,-1)\cup(6,\infty)$
13. 13, 15, 17
14. yes
15. D = all reals except $x\neq 2$
    $(-\infty,2)\cup(2,\infty)$
    R = all reals except $f(x)\neq 0$
    $(-\infty,0)\cup(0,\infty)$
16. D = $-1\le x\le 1$
    $[-1,1]$
    R = $0\le y\le 1$
    $[0,1]$
17. $g(-3)=8$, $g(7)=48$
18. a) $y=\dfrac{-5}{4}x-\dfrac{1}{2}$
    b) $m=\dfrac{-5}{4}$
    c) $m=\dfrac{4}{5}$

(19) a) $4x+y=5$
b) $x+3y=-3$

(20) a) $(-1,2)$
b) $(1,-2)$
c) $(2,-1)$

(21) -47

(22) $K=-3$

(23) $\begin{bmatrix} 8 & -11 \\ 22 & 12 \end{bmatrix}$

(24) $A^{-1} = \frac{1}{34}\begin{bmatrix} 7 & 3 \\ -2 & 4 \end{bmatrix}$

(25) 10

(26) $(4,0,-4)$

(27) 34 units^2

(28) 56 and 74

(29) rate of boat = 4mph
rate of current = 2mph

(30) Corner Points
$(0,5)$ $(3,2)$ $(0,0)$, $(3,0)$
max = 10 min = 0

(31) $\frac{D^3}{4a}$

(32) 5^{2N-8}

(33) $4x^0 = 4$

(34) $x^3-5x^2+11x-22+\frac{39}{x+2}$

(35) $(x-4)(2x+5)$

(36) $(2x-3)(4x^2+6x+9)$

(37) $(4ab+7)(4ab-7)$

(38) $(4x-9y)(x+2y)$

(39) $(4x-3)(2y-3)$

(40) $3(x^2+4y^2)(x+2y)(x-2y)$

41. $4x^2y^2\sqrt{3y}$

42. $3ab^2\sqrt[3]{2a^2}$

43. $\dfrac{\sqrt{15x}}{5x}$

44. $11\sqrt{3}-10\sqrt{2}$

45. -3

46. $\dfrac{15+5\sqrt{3}}{6}$

47. $\{26\}$

48. $x^{7/10}$

49. $4i\sqrt{2}$

50. $-4\sqrt{3}$

51. $6ab^2i\sqrt{a}$

52. -16

53. $\dfrac{-13+11i}{29}$

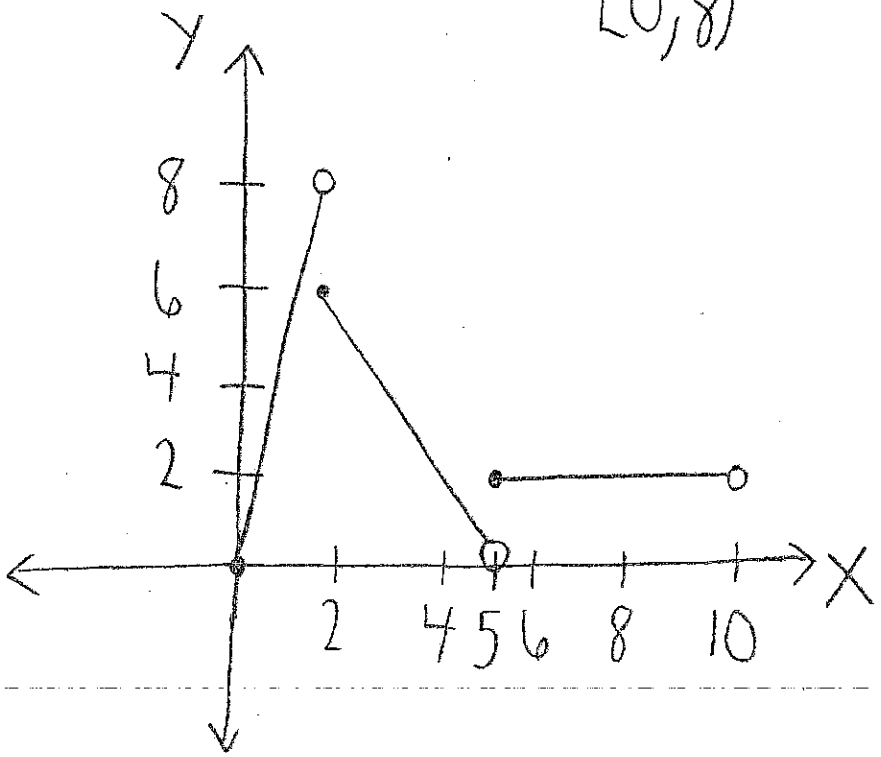
54. $\{\pm 5i\}$

55. $D = 0 \le x < 10$

$[0, 10)$

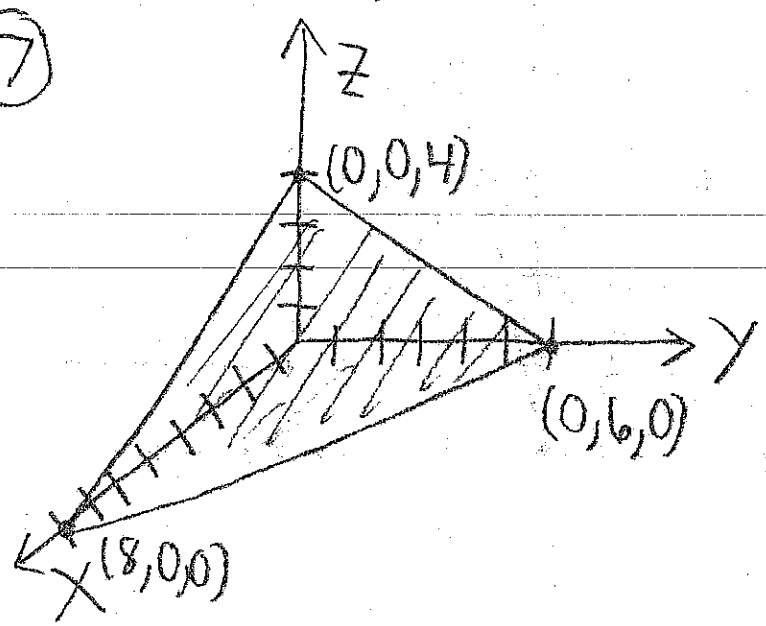
$R = 0 \le f(x) < 8$

$[0, 8)$



(56) A (0,0,0)
C (-6,4,0)
D (-6,0,0)
E (-6,0,-3)
F (0,4,-3)
G (0,4,0)
H (0,0,-3)

(57)



(58) 20N, 12D, 6Q

HONORS ALGEBRA 2 MIDTERM REVIEW

The following problems are review problems from your textbook that you can do for extra practice. Make sure to check your answers in the back of the textbook. The answers are provided for any even problems. **These problems, along with your midterm review packet, should give you a good review for the midterm exam. Good luck!!**

Chapter 1: Solving Equations and Inequalities

p. 15 # 21, 23, 29 – 33 odd

p. 49-50 # 33, 49, 51

Chapter 2: Linear Equations, Functions, and Linear Inequalities

p. 94 # 41 (piecewise function) + p. 102-104 # 26, 37, 39, 47, 49

26) answer is slope = $\frac{5}{6}$

Chapter 3: Systems of Equations and Inequalities

p. 125 # 5 + p. 132 # 17 + p. 133 # 21(look over linear programming) + p. 147-148 # 23, 27

Chapter 4: Matrices

p. 172 # 23 + p. 186 # 15, 27, 29 + p. 199 # 23, 25 + p. 211-213 # 20, 27, 35

20) answer = $\begin{bmatrix} 13 & -9 \\ 13 & -23 \end{bmatrix}$

Chapter 5: Polynomials, Factoring Polynomials, Radicals

p. 226-227 # 19, 33 + p. 242-243 # 9, 25, 27, 33, 35, 36, 37

36) answer $(t-2)(t^2+2t+4)$

p. 254 # 17, 19, 27, 29, 35, 39, 43 + p. 277-280 # 25, 27, 31, 45, 52, 61, 69, 71, 75

52) answer = $\frac{1}{9}$